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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/146,839 09/03/98 SRINIVASAN

A MI22-1017

021567 MM12/1021
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EXAMINER

MAI, A

ART UNIT

PAPER NUMBER

2814

DATE MAILED: 10/21/99

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary	Application No. 09/146,839	Applicant(s) SRINIVASAN ET AL.	
	Examiner Anh D. Mai	Art Unit 2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Status

- 1) ☒ Responsive to communication(s) filed on 03 September 1998.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☐ All b) ☐ Some * c) ☐ None of the CERTIFIED copies of the priority documents have been:
1. ☐ received.
2. ☐ received in Application No. (Series Code / Serial Number) _____.
3. ☐ received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

Attachment(s)

- | | |
|---|--|
| 14) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 17) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 15) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 18) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 16) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>2</u> | 19) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

Specification

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-8, 13-21, 23, 25 and 29-34 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Homma (U.S. Patent No. 5,288,518).

Homma teaches a method of forming an insulating material as claimed including:

providing a substrate (101) within a reaction chamber;

providing reactants comprising silicon, fluorine and ozone within the reaction chamber; and

depositing an insulating material comprising fluorine, silicon and oxygen onto the substrate from the reactants. (See col. 2, l. 30-col. 4, l. 34).

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With respect to claims 2 and 20, the fluorine containing silicon oxide material of Homma is deposited without the present of plasma.

With respect to claim 3, the fluorine containing silicon oxide material of Homma can be deposited with the present of plasma.

With respect to claim 4, the silicon and fluorine of the reactants of Homma are comprised within a common molecule.

With respect to claim 5, the silicon and fluorine of the reactants of Homma are comprised within a common molecule having an Si-F bond.

With respect to claims 6, 31 and 34, the silicon and fluorine of the reactants of Homma are comprised by triethoxy fluorosilane.

With respect to claim 7, the fluorine in the insulating material of Homma is present in Si-F bonds.

With respect to claim 8, the fluorine concentration in the insulating material of Homma is within the claimed range.

With respect to claims 13-15, 21, 23, 25, 30 and 33, phosphorus and boron can be doped into the insulating material of Homma singly or in combination.

With respect to claims 16, 17 and 19, the reactants of Homma comprise a molecule that includes both Si and F (triethoxy fluorosilane or F-TES) and another molecule that includes Si without F (tetraethylorthosilicate or TEOS).

With respect to claim 18, same reasons as claim 1 also apply.

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With respect to claim 29, the limitation of reduces flow temperature. The process of Homma contains all material limitations of the present claim, therefore, the reduces flow temperature should also be a result of a similar process.

With respect to claim 32, fluorine-containing insulating material of Homma has a higher density than that of non-fluorine-containing insulating material.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 9-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Homma as applied to claim 1 above, and further in view of Maeda et al. (U.S. Patent No. 5,800,877).

Homma teaches a method as described supra but fails to disclose the deposition rate of the insulating material and the pressure of the reaction chamber.

However, Maeda, in a similar method of forming an insulating material, discloses a deposition within the claimed range.

It would have been obvious to one having ordinary skill in the art at the time of the invention to deposit the insulating material of Homma at the rate of Maeda to save time.

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Further, the deposition method of Maeda is atmospheric pressure CVD therefore, the pressure of Maeda's reactor encompasses the claimed range.

It would have been obvious to one having ordinary skill in the art at the time of the invention to deposit the insulating material of Homma using APCVD as taught by Maeda to have a good quality silicon oxide film.

With respect to claim 12, the deposition temperature of Maeda is at the lower limit of the claimed range, however, no criticality has been established.

4. Claims 22, 24 and 26-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Homma as applied to claims 21, 23 and 25 above, and further in view of Monkowski et al. (U.S. Patent No. 5,104,482).

Homma teaches a method as described supra but fails to use tetraethoxy phosphine (TEPO) and triethyl borane (TEB) as the sources for phosphorus and boron dopants.

However, Monkowski, in a method of forming a doped insulating material, teaches using TEPO and TEB as the sources.

It would have been obvious to one having ordinary skill in the art at the time of the invention to use the dopant sources TEPO and TEB to form the doped insulating material of Homma as taught by Monkowski because these sources have lower toxicity, decreased pyrophoricity and increased chemical stability.

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Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anh D. Mai whose telephone number is 703-305-0575. The examiner can normally be reached on 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

A. M.

Anh D. Mai
October 13, 1999

Olik Chaudhuri